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(71) Applicant (for all designated States except US): **ERICSSON TELECOMUNICAÇÕES S.A.** [BR/BR]; Rua da Coroa, 500, Vila Guilherme, CEP-02047-020 São Paulo, SP (BR).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **DA SILVA GONZAGA, Alan, Magno** [BR/BR]; Rua Maria Fongaro, 515, Apto. 34, Vila Marlene, CEP-09732-050 São Bernardo do Campo, SP (BR). **BERNARDINO, Paulo, Sérgio** [BR/BR]; Rua Olivaldo Vila Nova, 284, Vila Filomena, CEP-04652-270 São Paulo, SP (BR). **RIBEIRO, Marcelo de Paula** [BR/BR]; Travessa Jorge Norton, 61, Apto. 84,

Centro, CEP-13015-160 Campinas, SP (BR). **MORALES RONCHI, Robinson** [BR/BR]; Avenida Nossa Senhora de Fátima, 415, Apto. 21, Taquaral, CEP-13090-000 Campinas, SP (BR).

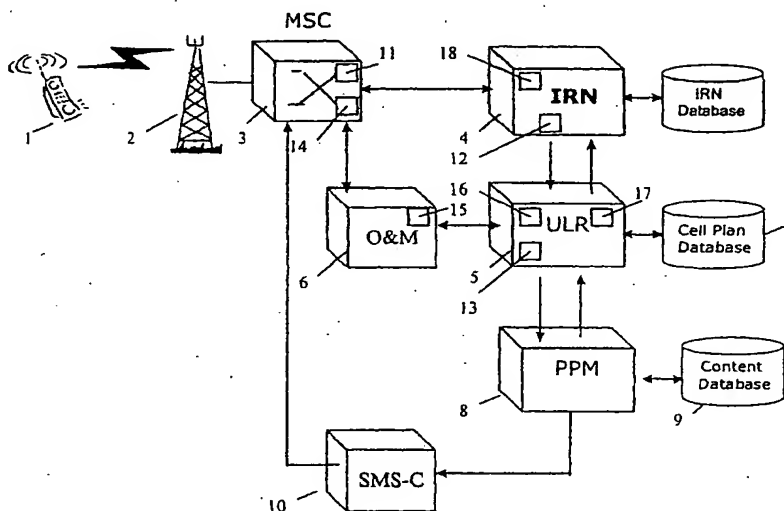
(74) Agent: **MOMSEN, LEONARDOS & CIA.**; Rua Teófilo Ottoni, 63 - 10th Floor, CEP-20090-080 Rio de Janeiro, RJ (BR).

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[Continued on next page]

(54) Title: METHOD AND APPARATUS FOR LOCATION BASED SERVICES IN A CELLULAR COMMUNICATION SYSTEM



(57) Abstract: The invention relates to a method and a system for a mobile user of the system with location based services. The system comprises an interactive response node (4) a user location retriever (5) which determines the location of the user from the identity of the MSC serving the user and the identity of the cell in which the user is situated. The cell identity is provided from an data file downloaded from the MSC by in response to a call path tracing command transmitted from an operation and maintenance platform (6). The interactive response node (4) interacts with the user to gain information on the service requested by the user. A post processing machine (8) is used to retrieve the requested service available in the area in which the user presently is, using said determined location of the user.



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## **METHOD AND APPARATUS FOR LOCATION BASED SERVICES IN A CELLULAR COMMUNICATION SYSTEM**

### **BACKGROUND**

In cellular mobile communication systems there is a commercial interest to be able to conveniently provide a mobile user of the system with location based services. There are already proposals for how to provide such services. However, such proposals often require substantial changes or amendments to the otherwise normal design of the system. In already existing systems it is desirable to be able to conveniently introduce location based services without having to introduce substantial changes in certain existing parts of the system. A corresponding need exists when customizing new systems based upon an existing generic design.

### **SUMMARY OF THE INVENTION**

In brief and somewhat simplified one problem to be solved by the present invention is to provide location based services in an existing cellular communication system without introducing substantial changes in existing devices in the system. A related problem to be solved by the present invention is to provide location based services in a new cellular system without having to introduce into the system substantial changes to devices in the system not specific to the location based services. E.g. it is desirable not to have to introduce substantial changes to the MSC, in particular the MSC software.

One key element/idea of the invention is to use functionality in a MSC and an operation and maintenance platform of the system already existing for other purposes also for locating of a user that makes a call for

service and for retrieving information on the MSC and transceiver that serve the user who should be provided with the requested services. More specifically a special call path tracing command, CTRAI, already arranged for other purposes, is used for retrieving the information.

5           Another key element/idea of the invention is to provide an interactive response node to whom a call for service from a user is directed. The interactive response node has functionality for maintaining the call from the user until a response from the MSC to the CTRAI command has been received, said response comprising identity of the MSC, the  
10 transceiver serving the user and the area, such as cell or sector, in which the user is situated when the call for service is made.

Additional elements or ideas of the invention are apparent from the claims.

In brief and somewhat simplified a method according to the  
15 invention comprises steps to send certain signals and messages between the interactive response node, a user location retriever, an operation and maintenance platform and the MSC, and to use the information retrieved from the MSC to control the location based services that should be delivered to the user.

20           In brief and somewhat simplified a system according to the invention comprises means for sending certain signals and messages between the interactive response node, a user location retriever, an operation and maintenance platform and the MSC, and means for using the information retrieved from the MSC to control the location based services  
25 that should be delivered to the user.

Once the location of the calling user has been determined, the call from the user may be ended/cleared. Based upon the location information thus determined, the service requested by the user is retrieved from a content data base and is delivered to the user in form of one or more SMS-messages. In the alternative the requested service is delivered in a voice message to the user. In the latter case the call for service can but need not be cleared before the service is delivered to the user. This especially applies if the interactive response node is an interactive voice response device that inter-works with a text-to-speech conversion device that converts the information retrieved from the content data base into speech.

Embodiments of a method according to the invention are disclosed in the disclosure.

### **BRIEF DESCRIPTION OF THE DRAWINGS**

Figure 1 is an overall view of the main components of a general cellular communication system and

Figure 2 is an detailed view of the additional devices used to specialize the general cellular system shown in Figure 1 for the purposes of the present invention.

### **DISCLOSURE OF PREFERRED EMBODIMENTS**

The main components of a general cellular communication system shown in Figure 1 are a plurality of mobile service switching centers MSC 1 ... MSC N. Each MSC serves a number of base stations BS 1 ... BS n. Each base station BS comprises a plurality of transceivers TRX. Each TRX provides a plurality of traffic channels used for traffic to/from a number of mobile stations, also referred to as cellular phones. A TRX

serves either an area called a cell or a sector of a cell in which users of the mobile telephones can move.

In the area served by a base station there may be local services available, such as banks, restaurants, petrol stations, shops, weather forecast  
5 information, stock information etc.. A user may for example want to know if there is a Japanese restaurant within the area he/she is presently visiting. The user makes a call for service, also referred to a service request call, using a special telephone number, below referred to as a B-number. The user makes the service request call on his/he mobile telephone 1. Via a  
10 TRX in a base station 2, shown in Figure 2 and served by an MSC 3, the call will be routed to an interactive response node 4. The interactive response node interacts with the user in order to find out the particular service the user wants.

Depending on the system design the interaction may be voice  
15 guided or text guided. As a result of the interaction the interactive response node receives detailed knowledge of the requested service.

As an example the user may dial \*REST if restaurant services are requested. Next the user may press 1 for Japanese restaurants, 2 for Swedish, 3 for Brazilian.. etc. This could also be done via voice recognition  
20 if the IVR supplier can provide that If voice guided the interactive response node may comprise an interactive voice reply device prompting the user with voice messages to make his service selection following a decision tree. For example the user is instructed to press button 1 on the mobile telephone key pad if information on restaurants are requested, to press button 2 if  
25 information on banks is requested. Once a button has been pressed, a new voice message may prompt the user to make a refined service choice. The

process is repeated until the end of the decision tree is reached and all required information has been received at the interactive response node.

Immediately when the interactive response node receives the call it will transmit a data string to a user location retriever 5. The data string contains the A-number (the mobile telephone number of the user's mobile telephone), the dialed B-number (i.e. the service requested), plus the MSC ID, i.e. the identity of the MSC to which the subscriber is connected. In this first transmission to the user location retriever the data string's service request field is empty, since the user has not yet had time to make all service selections. This first transmission is to gain some time and to allow the system to start the location process.

In the user location retriever the B-number is analyzed. If the B-number is recognized as a location based request the user location retriever will request the position of the A-number (i.e. the position of the user) from the MSC. To this end a location request is sent via an operation and maintenance platform 6 to the MSC. The location request is using a call path tracing command CTRAI. This command will return a file containing information about the identity of the transceiver TRX to which the user is connected. During this inquiry the user must be connected to the interactive response node. As soon as the response from the MSC is received the call may be cleared.

The reason for using the operation and maintenance platform as kind of a gateway when communicating with the MSC is that the user location retriever cannot connect directly to the MSC via the TCP/IP protocol, since no such interface exists on the MSC.

When the CTRAI command has been answered, the user location retriever will inform the interactive response node that the call may be cleared. The interactive response node will then tell the user to hang up the phone when feasible, e.g. when the user reaches the end of the above mentioned decision tree or finishes pause music or pause voice information messages.

In the meanwhile the user location retriever will match the answer to the CTRAI command, i.e. the transceiver TRX ID, with the MSC ID in a list with corresponding cells/sectors in order to determine the location (Cell ID) of the user. This cell list is held and updated in a cell plan database 7.

During the time the user location retriever is locating the subscriber the interactive response node will 'entertain' the user. In the interactive response node the user makes his service selections in the manner described above. As soon as the user has made this/her final choice the interactive response node will again send the data string to the user location retriever, said data string containing the A-number, service requested (dialed numbers) and MSC ID.

In case there is a queue of location requests to the MSC, the user location retriever will keep track of this queue. During this time, the interactive response node will guide the user through the decision tree menu/play music/give information in order to keep the user on-line until the response to the first CTRAI command is obtained. When the user location retriever response receives the response it will give gives the interactive response node the permission to clear the call.

Next the user location retriever forwards the A-number and service request (dialed numbers) plus the Cell ID to a post processing machine 8. The post processing machine matches the service request (dialed number) and the location (Cell ID) with a content database 9  
5 connected to the post processing machine. This database will hold the content, the information about the cell areas and a list with information about what device in each MSC is corresponding to which cell in the network. The database will manually be updated with cell information, e.g. latitude/longitude of center point and radius. The database 9 also has a  
10 WEB interface for retailers, restaurants, business units and other service providers so that they via Internet can update the database with their latest offers, bargains and other information.

Next the post processing machine divides the content returned from the database 9 in response to the result of said matching (= the service  
15 requested by the user) in a suitable number of SMS messages (SMS= short message service). The SMS messages are forwarded to an SMS center 10 from where they are forwarded to the correct A-number. When the user receives the SMS messages on his/her mobile telephone the requested service is delivered.

20 The post processing machine is a software application and has several functions such as: to receive a service request and a location, to match the Cell ID with an area, to search the data base 9 for requested content within that area (Cell ID) and to produce statistical reports.

Although not described above it should be understood that the  
25 MSC, interactive response node, user location retriever, operation and maintenance platform comprise software and hardware means for

performing the method steps described above. In particular the MSC comprises means 11 for forwarding from a mobile user served by the system a call requesting a desired service to the interactive response node. The interactive response node comprises means 12 for sending from the  
5 interactive node to the user location retriever the subscriber number of the mobile user, the identification of the service and the identity of the MSC serving the user. The user location retriever comprises means 13 for sending from the location retriever to the operation and maintenance platform the subscriber number and a request for transmission to the  
10 serving MSC the call path tracing command (CTRAI) and for receiving from the operation and maintenance platform a subscriber data file comprising what transceiver device the user is connected to. The MSC further comprises means 14 for sending to the operation and maintenance platform the requested data file relating the subscriber. The operation and  
15 maintenance platform is further provided with means 15 for forwarding to the location retriever information in the data file comprising the identity of the transceiver device TRX ID. The user location retriever further comprises means 16 for extracting the transceiver identity TRX ID from the information received from the platform. The user location retriever is also  
20 provided with means 17 for informing the interactive that the call may be ended.

The interactive response node is further provided with means 18 for attempting to maintain from the interactive node the call with the user at least until receipt of the information that the call may be ended.

25 Said means 12 further include (i) means for including the identity of the serving MSC and the subscriber number in the first message

from the interactive response node to the location retriever and (ii) means for including the identification of the service in the second message from the interactive node to the location retriever. Likewise said means 16 include means for sending the subscriber number and the request for  
5 transmission to the operation and maintenance platform without awaiting the second message. Said means 17 further include means for determining the identity of the cell of the subscriber by using the identity of the serving MSC and the identity of the transceiver device.

The user location retriever 5, the interactive response node 4,  
10 the operation and maintenance platform 6, the cell plan database 7, the post processing machine 8, the content database 9 and the SMS-Center 10 have been shown to serve one MSC but it should be understood that they can serve many MSCs in the cellular system.

## CLAIMS

1. A method for providing location based services to a mobile user in a cellular communication system comprising the steps of:

- 5           - making from the mobile user a call relating to a desired service;
- forwarding the call for service to an interactive response node (4) in the system;
- sending from the interactive node the subscriber number of the mobile user, the identification of the service and the identity of the serving MSC to a user location retriever (5);
- 10          - sending from the location retriever to an operation and maintenance platform (6) the subscriber number and a request for transmission to the serving MSC a call path tracing command (CTRAI) for receiving a subscriber data
- 15          file comprising what transceiver device (TRX) the subscriber is connected to;
- sending from the MSC to the operation and maintenance platform the requested data file relating to the subscriber;
- forwarding from the operation and maintenance platform to
- 20          the location retriever information in the data file comprising the identity of the transceiver device;
- extracting at the location retriever the transceiver identity from the information received from the platform;
- informing the interactive node from the location retriever
- 25          that the call may be ended;

- maintaining from the interactive node the call with the user at least until receipt of the information that the call may be ended;
  - providing to the user services requested relevant to the location of the user as determined by the serving MSC and transceiver device identity.
- 5
2. A method according to claim 1 wherein:
- the identity of the serving MSC and the subscriber number is sent from the interactive node (4) in a first message to the location retriever (5);
  - the identification of the service is sent from the interactive node (4) in a second message to the location retriever (5); and
  - the subscriber number and the request for transmission is sent from the location retriever to the operation and maintenance platform without awaiting the second message.
- 10
- 15
3. A method according to claim 1 wherein:
- the identity of the cell of the subscriber is determined using the identity of the serving MSC and the transceiver device (TRX); and
  - the identity of the cell is used for controlling the service provided to the user.
- 20
4. In a cellular communication system comprising a MSC connected to multiple transceiver devices (TRX) for multiple cells, an interactive response node (4), an operation and maintenance platform (6)
- 25

and devices (10) for providing to mobile users location based services, comprising:

- 5           - means (11) for forwarding from a mobile user served by the system a call requesting a desired service to the interactive response node (4) in the system;
- a user location retriever (5);
- means (12) for sending from the interactive node to the user location retriever the subscriber number of the mobile user, the identification of the service and the identity of the MSC  
10           serving the user;
- means (13) for sending from the location retriever (5) to the operation and maintenance platform (6) the subscriber number and a request for transmission to the serving MSC a call path tracing command (CTRAI) for receiving a  
15           subscriber data file comprising what transceiver device the user is connected to;
- means (14) for sending from the MSC to the operation and maintenance platform the requested data file relating the subscriber;
- 20           - means (15) for forwarding from the operation and maintenance platform to the location retriever (5) information in the data file comprising the identity of the transceiver device (TRX);
- means (16) for extracting at the location retriever (5) the  
25           transceiver identity from the information received from the platform (6);

- means (17) for informing the interactive node (4) from the location retriever that the call may be ended;
  - means (18) for attempting to maintain from the interactive node the call with the user at least until receipt of the information that the call may be ended; and
  - means (8,9) for providing to the user services requested relevant to the location of the user as determined by the serving MSC and transceiver device identity (TRX ID).
- 5
5. A system according to claim 4 comprising:
- means (12) for including the identity of the serving MSC and the subscriber number in a first message from the interactive response node to the location retriever;
  - means (12) for including the identification of the service in a second message from the interactive node to the location retriever; and
  - means (16) for sending from the location retriever the subscriber number and the request for transmission to the operation and maintenance platform without awaiting the second message.
- 10
- 15
- 20
- 25
6. A system according to claim 4 or 5 comprising:
- means (16) for determining the identity of the cell of the subscriber by using the identity of the serving MSC and the identity of the transceiver device; and
  - means (8) for using the identity of the cell for controlling the service provided to the user.

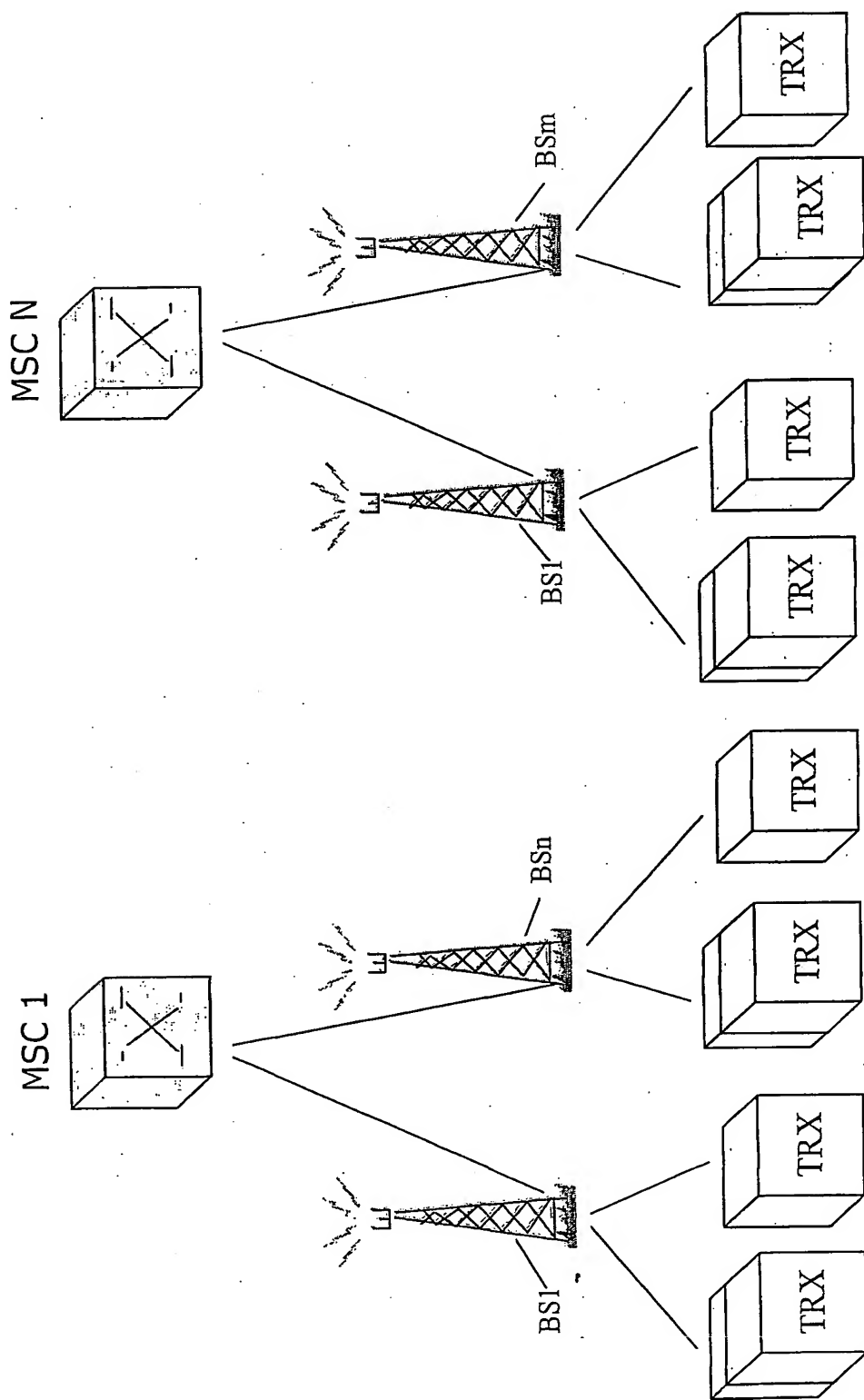


FIG.1

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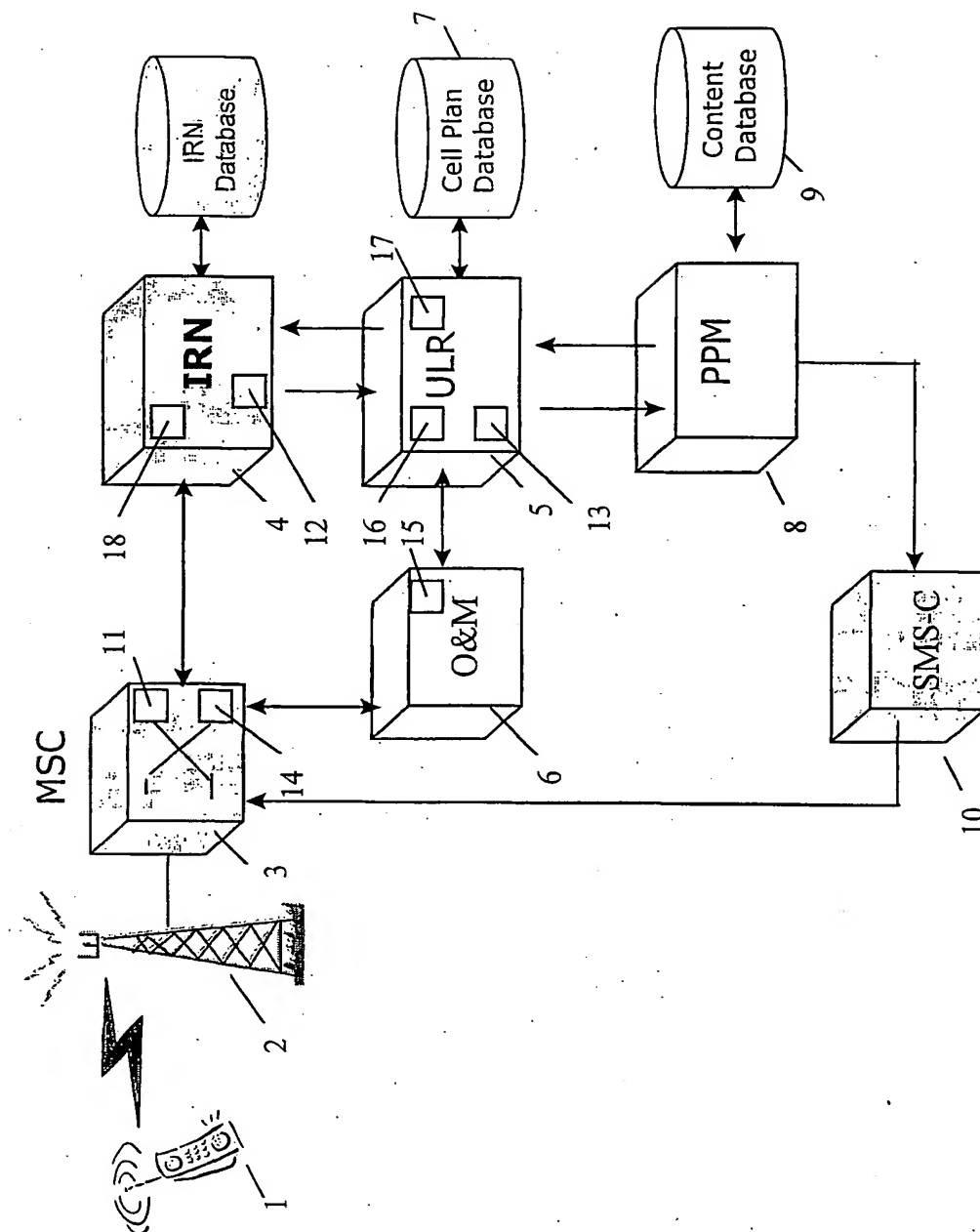


FIG. 2

## INTERNATIONAL SEARCH REPORT

International Application No.

PC, JR 00/00136

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 H04Q7/38

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 H04Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ

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A	EP 0 647 076 A (COFIRA SA) 5 April 1995 (1995-04-05) abstract column 3, line 39 -column 4, line 54 column 7, line 48 -column 10, line 33 figures 2,3	1,4
A	WO 97 41654 A (MCLORINAN ANDREW GEORGE ;TSOUKAS GEORGE JAMES (AU); ERICSSON TELEF) 6 November 1997 (1997-11-06) abstract page 2, line 19 -page 4, line 14 page 8, line 20 -page 11, line 5 figure 1	1,4



Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

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European Patent Office, P.B. 5818 Patentlaan 2  
NL - 2280 HV Rijswijk  
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,  
Fax: (+31-70) 340-3016

Authorized officer

Rabe, M

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## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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APPLICANT: Peter Weiss

LERNER AND GREENBERG P.A.

P.O. BOX 2480

HOLLYWOOD, FLORIDA 33022

TEL. (954) 925-1100